

CLAIMS

1. A method to fix metal fine particles on surface of a substrate by desired fine structure corresponding to an irradiation of lower power and/or lower density electromagnetic wave comprising;
 - (a) adding metal fine particles stabilized by a dispersion stabilizer, which can be released by irradiation of high energy electromagnetic wave and/or high energy density electromagnetic wave, to a solution containing a dispersing agent which can be released by irradiation of lower energy electromagnetic wave and/or lower energy density electromagnetic wave and/or a compound which does not have bonding ability to the metal fine particles to prepare a colloidal dispersion of metal fine particles which are a part of the dispersion stabilizer being substituted with the dispersing agent and/or the compound,
 - (b) irradiating high energy electromagnetic wave and/or high energy density electromagnetic wave to said prepared colloidal dispersion to release a part of the dispersion stabilizer locating on the surface of metal fine particles and generate a dispersion of metal fine particles which is activated so as to cause flocculation of 2-100 times larger to the original particle size and to improve photo sensitivity of the metal fine particles stabilized by said dispersion stabilizer, and (c) irradiating lower energy electromagnetic wave and/or lower energy density electromagnetic wave to said metal fine particles dispersion whose photo sensitivity is improved by activation.
2. The method to fix metal fine particles on surface of the substrate by desired fine structure of claim 1, wherein the compound which does not have bonding ability to a dispersing agent released from the surface of the metal fine particles by irradiation of electromagnetic wave of lower energy than a dispersion stabilizer of metal fine particles and/or metal fine particles is a compound whose solvent affinity part is small and/or a compound which causes the release by absorbing said electromagnetic wave.
3. The method to fix metal fine particles on surface of the substrate

by desired fine structure of claim 1, wherein the dispersion stabilizer is a compound possessing thiol group, amino group, silyl group or cyano group which has high affinity with metal fine particles.

4. The method to fix metal fine particles on surface of the substrate by desired fine structure of claim 1, wherein the dispersion stabilizer is a compound possessing thiol group, amino group, silyl group or cyano group which has high affinity with metal fine particles, and the compound which does not have bonding ability to a dispersing agent released from the surface of the metal fine particles by irradiation of electromagnetic wave of lower energy than a dispersion stabilizer of metal fine particles and/or metal fine particles is a compound whose solvent affinity part is small and/or a compound which causes the release by absorbing said electromagnetic wave.

5. The method to fix metal fine particles on surface of the substrate by desired fine structure of claim 3, combining same kinds of electromagnetic waves having different energy intensity and/or different energy density and carrying out at least two steps of irradiation process of electromagnetic wave comprising, at least one step of irradiation process by high energy intensity electromagnetic wave and/or high energy density electromagnetic wave and at least one step of irradiation process by low energy intensity electromagnetic wave and/or low energy density electromagnetic wave.

6. The method to fix metal fine particles on surface of the substrate by desired fine structure of claim 4, combining same kinds of electromagnetic waves having different energy intensity and/or different energy density and carrying out at least two steps of irradiation process of electromagnetic wave comprising, at least one step of irradiation process by high energy intensity electromagnetic wave and/or high energy density electromagnetic wave and at least one step of irradiation process by low energy intensity electromagnetic wave and/or low energy density electromagnetic wave.

7. The method to fix metal fine particles on surface of the substrate by desired fine structure of claim 6, wherein the particle size of the metal fine particles stabilized by a dispersion stabilizer is from 1nm to 100nm.

8. The method to fix metal fine particles on surface of the substrate by desired fine structure of claim 1, wherein the particle size of the metal fine particles stabilized by a dispersion stabilizer is from 1nm to 100nm.

9. The method to fix metal fine particles on surface of the substrate by desired fine structure of claim 3, wherein the particle size of the metal fine particles stabilized by a dispersion stabilizer is from 1nm to 100nm.

10. The method to fix metal fine particles on surface of the substrate by desired fine structure of claim 4, wherein the particle size of the metal fine particles stabilized by a dispersion stabilizer is from 1nm to 100nm.

11. The method to fix metal fine particles on surface of the substrate by desired fine structure of claim 1, wherein the dispersing solvent is at least one selected from the group consisting of alicyclic hydrocarbon and aromatic hydrocarbon.

12. The method to fix metal fine particles on surface of the substrate by desired fine structure of claim 3, wherein the dispersing solvent is at least one selected from the group consisting of alicyclic hydrocarbon and aromatic hydrocarbon.

13. The method to fix metal fine particles on surface of the substrate by desired fine structure of claim 4, wherein the dispersing solvent is at least one selected from the group consisting of alicyclic hydrocarbon and aromatic hydrocarbon.

14. The method to fix metal fine particles on surface of the substrate by desired fine structure of claim 5, wherein the dispersing solvent is at least one selected from the group consisting of alicyclic hydrocarbon and aromatic hydrocarbon.

15. The method to fix metal fine particles on surface of the substrate by desired fine structure of claim 6, wherein the dispersing solvent is at least one selected from the group consisting of alicyclic hydrocarbon and aromatic hydrocarbon.

16. The method to fix metal fine particles on surface of the substrate by desired fine structure of claim 7, wherein the dispersing solvent is at least one selected from the group consisting of alicyclic hydrocarbon and aromatic hydrocarbon.